JUL 31 1913

JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

Entered as second class matter May 7, 1906, at the Post Office at San Francisco, Cal., under the act of Congress March 3 1879.

VOL. XXXI NO. 4 | SAN FRANCISCO, JULY 26, 1913 | PER COPY, 25 CENTS

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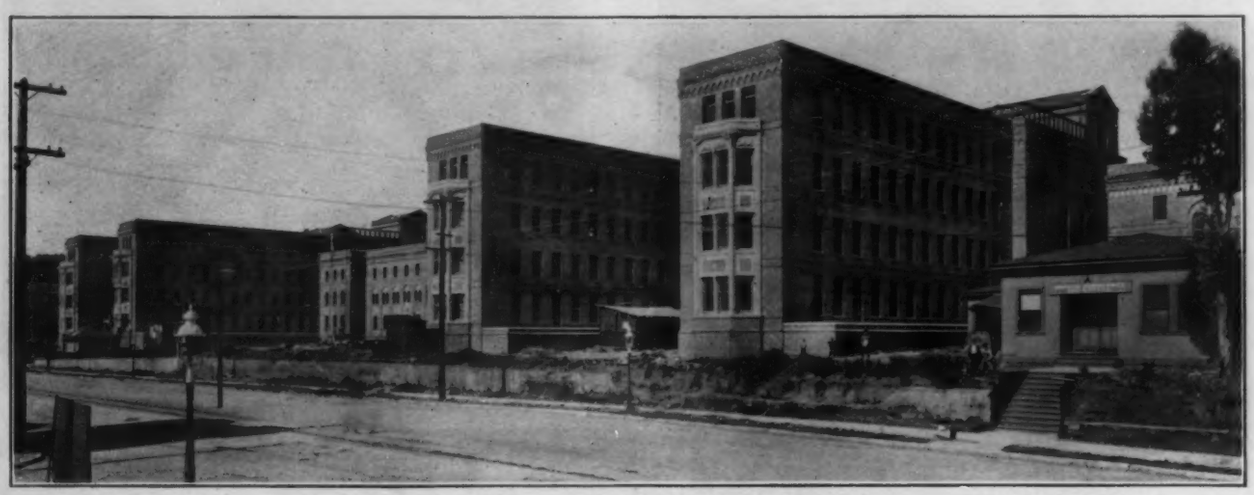
ELECTRICAL EQUIPMENT OF SAN FRANCISCO HOSPITAL

BY C. F. BUTTE.

The importance and extent of an electrical installation within hospital buildings is of sufficient interest to warrant a description of that in the new City and County of San Francisco Hospital. The buildings are situated in the form of a cross, the power house, service building and laundry in the rear forming one leg, the receiving building, ward buildings and nurses' home, forming the center leg and the administration building forming the front leg. The distance from the receiving building to the nurses' home is 860 ft. with one continuous corridor 780 ft. long. The administration building is 79 x 171 ft., three floors and basement; the power house 185 x 99 ft., two floors; the receiving building 204 x 111ft., five floors and basement, and four ward buildings, each 212 x 30 ft., four floors and basement; service building 171 x 109 ft., three floors and basement and nurses' home, 148 x 84 ft., three floors and basement.



New City and County Hospital at San Francisco.

The service conduits feeding these various buildings enter the power house through a tunnel and thence to the various main switchboards through the basement corridor. The tunnel from the basement corridor to the power house is 230 ft. long and the basement corridor is 782 ft. making a total run of 1012 ft.

The necessity of an absolutely reliable source of power in a hospital has been well taken care of by four 500 amp. 125-250 volt generators, each direct connected to steam turbines, with rated capacity of 125 kw. at 2400 r.p.m. working under 150 lb. steam pressure. The boiler plant consists of four banks of Risdon water tube boilers equipped with Foster superheaters and Dahl oil burners. The oil tank has a capacity of 11,400 gallons. In addition to all of the above units, an emergency service switch has been provided on the power house switchboard to throw in any outside source of supply that may be installed.

The power house switchboard consists of 11 panels, namely 5 generator panels (1 panel for a future unit), 1 main lighting and 1 main power panel, 3 lighting feeder and 1 power feeder panels and is 24 ft. in length and 7 ft. 6 in. high. The main busbar switches have a capacity of 8000 amperes.

From the power house switchboard separate light and separate power feeders have been provided to each and every building. These feeders connect to the rear of the power house switchboard through a large pull-in box directly beneath. This box is 2 ft. x 2 ft. 6 in. and 22 ft. long, made of heavy boiler plate and wherein all jumping is done in order to bring out the feeders

in regular rotation to their respective switches. From this point the feeders connect to individual main switchboards in each building, eleven in number and consisting of a blue Vermont marble slab, with a main power and light switch and sub feeder switches for each panel board in the respective building, requiring 152 polished knife switches, ranging from 30

Boiler Room.

Turbo-Generator Room.

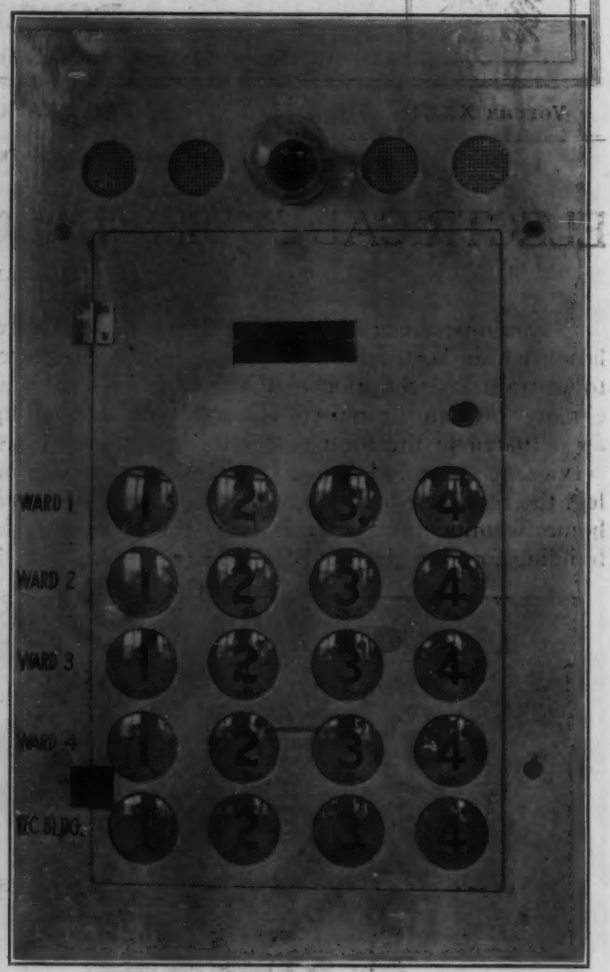
to 400 amperes. There has been installed 6500 ft. of feeder conduit ranging from 1 to 3½ in., for these feeders, using 18,000 ft. of feeder wire ranging from No. 8 stranded wire to 600,000 c.m. cable.

From each of the above switchboards individual sub-feeds are run to each panel board located on the various floors. These panel boards are 47 in number and range from 10 circuits to 32 circuits. The total number of panel circuits is 614, ramifying to 4160 light outlets and 61 motor outlets ranging from 1/6 to 35 horsepower.

The total number of feet of conduit used in this installation in size from ½ to 3½ in. is 136,860 ft. In branch circuit work alone 108,600 ft. No. 14 duplex wire is installed and 32,100 ft. of telephone wire.

Particular care has been taken with the telephone systems which are throughout installed in conduit work. Three individual runs are provided to each station, one for public phones, one for private and one for a special house system to be installed later. Ninety-nine stations have been installed with provisions for 120 more.

In addition to the telephone systems, conduits have been installed for a visual doctor's call system with 24 stations, one at each cross corridor of each floor, to call any doctor or interne from the main office. The system will consist of double-faced luminous indicators at each point which will illuminate simultaneously any number or numbers throughout all buildings at one time at all of the 24 stations and will be controlled from the main office in the admin-



Master Silent Signal Annunciator.

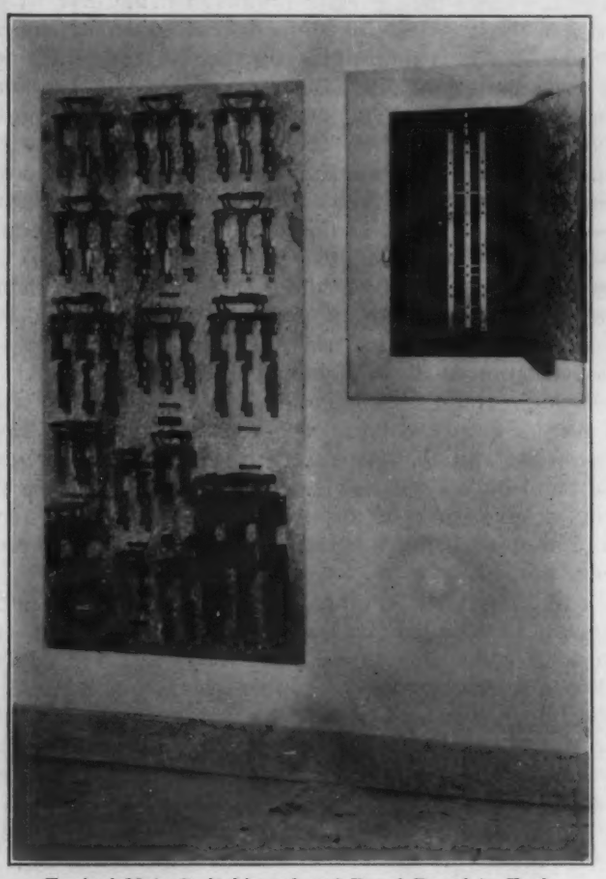
istration building. A buzzer system has also been installed with buzzers at 24 different points similarly located as the visual system outlets

These buzzers can be rung from the main office either all 24 at one time or each building individually and can be used for a program system or in place of the visual calls. The buzzer system is operated from a 6 cell, 40 ampere hour storage battery located in the battery room.

In order to provide means for the patients to call the nurses a silent visual call system has been installed. Over each and every bed a special signal light has been placed and connecting therewith is a call switch at the end of a 6 ft. cord. In addition to this light, a light has been placed over the ward door both inside and outside, another light at the nurses' desk and one in each diet room.

If the patient presses the call button, it automatically locks itself and lights the lamp over the bed, operates a relay which lights the lamp over the doors, at the desk and in the diet room. To further protect the

patient a master annunciator is installed in the main office which indicates the calls not answered in any or all of the wards, thereby indicating to the superintendent whether the calls are attended to. The call switch at the bed requires a key carried by the nurse to reset it for another call, thereby compelling the nurse to



Typical Main Switchboard and Panel Board in Each Building.

go to the bed before any light can be extinguished. Five hundred and twenty-seven silent signal call stations have been provided. This system is operated on 110 volts direct from the lighting mains and will operate on either direct or alternating current.

The time elements have also been fully taken care of by the installation of a complete electric clock system consisting of 78 stations. The clocks are all set flush with the wall and have a 12 in. white marble dial with bronze numerals and hands. These clocks are operated from a four circuit master clock in the superintendent's office. The current for the clocks is provided by 25 cells of storage batteries, which are in duplicate to obviate any interruption in the service. Each bank of cells is capable of operating the clocks for one week. A charging panel with necessary switches, meters no-voltage release and rheostats to charge for the 110 volt circuit has been provided. A separate room has been set aside for this equipment and which has been arranged in a very satisfactory manner.

Semi-indirect lighting is used for the wards with dust-proof covers over the bowls. While the hardware and switch plates are all nickel on account of wear, the fixtures are white enamelled and with plain lines. All ornamentations have been omitted to prevent dust collection. The fixtures in the operating rooms will be adjustable and can be set in any position. In these rooms an additional precaution has been taken by the installation of gas outlets.

Conduits in Tunnel to Main Switchboard.

In the hydro-therapeutic room, an electric cabinet, an electric bath and a galvanic and faradic treatment coil has been provided. All the electrical construction was performed by the Butte Engineering & Electric Company.

CO-OPERATION BETWEEN FOREST SERVICE AND USERS.

To give settlers and other local users a larger voice in national forest administration, Secretary of Agriculture Houston has promulgated a new regulation, providing a means by which the forest service may systematically co-operate with duly organized associations of such users. Any association whose members include a majority of the local residents making use of the national forests may get together and select a committee, to meet with the local forest officers. This committee will be recognized in an advisory capacity in settling questions which may arise between the forest service and the public in the use of the forests.

This regulation is designed to prevent any local feeling that a western user in contact with the national forest administrative system is up against a far-away bureau at Washington, represented on the ground by a forest officer who can do as he chooses and against whose actions it is impossible to make effective protest.

It is the announced policy of the department to favor the greatest good to the greatest number, and the local user over others. With the help of the advisory boards now provided for, many of the problems affecting individuals which the application of such a policy involves can be settled by submitting them to what is practically the organized public sentiment of their own neighbors. On the other hand the organization can initiate questions and bring them to the attention of the forest service, backed by the voice of the majority of those who are dependent upon the forest industries.

HEAVY OIL AS FUEL FOR INTERNAL-COMBUSTION ENGINES.

BY IRVING C. ALLEN.

The many inquiries addressed to the Bureau of Mines regarding the supply of heavy oils and the use of these oils as fuel for steam raising and for internal-combustion engines have made advisable the issue of Technical Paper No. 37 (from which this article is condensed). It presents the result of an extended search in the United States and abroad for some means of more effectively burning the heavy asphaltum oils of the Pacific and Gulf coasts.

On the Pacific and Gulf coasts of the United States, not to consider the increasing output in Mexico, there is produced a great quantity of heavy asphaltum oils. These may be refined and first class products manufactured therefrom. In this refining, as also in the refining of the petroleums from the other oil fields of the United States, there is produced a so-called gas oil, which is that portion of the petroleum distilling between the heavy naphthas or kerosenes and the light spindle oils. It is too heavy for lamp oils or for burning in a gasoline engine, and is too light for lubricants. The United States Geological Survey states that there was produced in 1911 from the California and Gulf coast oil fields 101,381,285 barrels of crude petroleum, valued at $50,942,446. This petroleum on refining would have yielded approximately 5 per cent, or 5,069,064 barrels, of gas oil. From the other oil fields of the United States in 1911 there was produced 119,068,106 barrels of crude petroleum, valued at $83,102,306, of which approximately 3 per cent, or 3,572,043 barrels, was gas oil, making a total of 8,641,107 barrels of gas oil.

This gas oil, as its name implies, can be cracked in hot retorts and an excellent illuminating gas made therefrom, or it may be burned with good results as a fuel under steam boilers.

By being mixed or blended with a small proportion of the low-boiling natural gasolines gas oil can be enlivened, by increasing its volatility and lowering its specific gravity and flash point, and made to burn in explosion engines. Even with the above uses gas oil has been produced in greater quantities than can be efficiently consumed, and its profitable disposal has been a burden on the refiners. In the past few months, however, due to the enormous demand for gasoline, gas oil has been recracked in the stills at the refineries and a part converted into gasoline.

This led the Bureau of Mines to seek more efficient means for its use. The heavy-oil internal-combustion engine—that is, the various modifications of the Diesel type—seemed to open a promising field, and a critical study of these engines abroad and in the United States has developed very encouraging results.

As approximately 0.4 pound of an oil similar to gas oil will produce 1 horsepower-hour when burned in a heavy-oil engine, the total production of gas oil from the petroleum fields for 1911 would alone, without considering the vast resources of coal and wood oils, develop approximately 6,351,213,645 horsepower-hours without in any way interfering with the uses of the other petroleum products now manufactured. This would mean the addition of about 725,000 horsepower running continuously throughout the year.

Use of the Heavy-Oil Engine in the United States.

Diesel developed his engine in the early nineties, and has since then greatly improved it and has made of it a most successful and efficient power producer. At present it is thoroughly dependable and will burn a great variety of oils. But only within the past four or five years, however, has the engine been successfully constructed within the United States. Although the prime requisite in Europe seems to be economy in operation, low first cost seems to be a more important requirement in this country, and at first comparison with the steam engine the Diesel seems to be exceedingly costly. Small imperfections in mechanical construction, up to within a very recent date, seem also to have had their influence upon the non-construction of the engine in the United States. Also, although the general industrial profits within the United States are large, the very abundance of raw materials and the general extravagance in their use seem to have combined against the wide adoption of this engine, in spite of its being so highly efficient and in spite of the fact that it has met with such success abroad.

Although the engines are reliable, lack of experience in handling engines with such high cylinder pressures has raised in some cases an undeserved prejudice against their use. Trouble in starting is usually due to unclean and ill-adjusted valves, and an auxiliary air supply is necessary. The exhaust valves become pitted and must be reground about every three months; but 15 minutes should suffice to replace a worn valve with a new one. Also, more lubricating oil is required than with a steam engine.

Fuel Economy of Heavy-Oil Engine.

In a heavy-oil engine 200 to 250 grams, or approximately 0.4 pound, of oil is consumed in developing 1 horsepower-hour, whereas for a steam engine of the best triple-expansion type, from 1.1 to 1.8 pounds is necessary. This difference in fuel consumption gives an efficiency of the oil engine compared with the steamer of from 0.4 to 1.1 pounds, or a ratio of approximately 1 to 3, or conservatively 10 to 25 in favor of the oil engine.

The efficiency of coal as compared with fuel oil for steaming is variously estimated at 10 to 17, 10 to 15.5, and 10 to 16.1. It may be of interest to note that a turbine engine taking steam from boilers fitted with the best Koerting burners for oil, with accessories complete, built by the Franco Tosi Company, Milan, and installed at the Turin Exposition in 1911, required two and one-half or more times the weight of oil fuel per horsepower than did a Diesel engine built and installed by the same company at the same time and place for purposes of direct comparison, thus giving a ratio of 25 to 10 in favor of the Diesel engine.

Per unit weight, not considering the relative storage capacities needed, the quantity of oil required for burning in an oil engine compares with the quantity

of coal required for steam production as 35 to 10, as shown from the following statement:

FUEL ECONOMY.

Oil storage, 11.5, to coal storage, 10.

Calorific value of oil, 14, to calorific value of coal, 10.

Oil burned in an oil engine, 25, to oil burned for steam production, 10.

One gallon of water at 15 degrees C. weighs 8.3316 pounds.

The average specific gravity of California crude oils is 0.9574 at 15 degrees C.

One barrel (42 gallons) of California crude oil weighs, therefore, 335 pounds, and is equivalent to 1,172.5 pounds, or 0.58625 ton, of coal. From this ratio the cost of either fuel can be calculated from the market quotations.

The quantity of oil required in a heavy-oil engine and its resulting efficiency, estimated within a margin of about 5 per cent, is approximately shown in the table following:

Fuel Consumption and Efficiency of a Heavy Oil Engine.

Load.	Pounds of oil per brake horsepower hour. Pound.	Thermal efficiency (based on brake horsepower hour). Per cent.	Mechanical efficiency. Per cent.
Fuel load	0.472	30	74
¾ load	.500	..	65
½ load	.562	26	58
¼ load	.748	..	47

When one considers that in good steam boiler and engine units the ordinary thermal efficiency is only 12 to 13 per cent, the advantage of the heavy-oil engine, for marine work particularly, is apparent.

The distribution of the total heating units from an oil when used in a Diesel engine is about as follows:

Heat Balance of the Diesel Engine.

	Per cent.
Total heating value of fuel	100.0
Indicated horsepower	44.2
Brake horsepower	32.7
Friction of air, water, and oil pumps	11.3
Cooling water	33.3
Exhaust gases	22.7

Combustion of the Fuel.

In selecting a fuel for this engine its composition as affecting combustion is most important. For proper combustion the fuel should be mobile and volatile, clean, and free from water, solid particles, and grit. In general the specific gravity of an oil rises directly as the vapor density. The boiling point and the amount of air necessary for combustion vary inversely with the volatility, and the greater the volatility of the fuel the better the ignition and combustion. The calorific value of bituminous tars in general is lower than that of lignite tars or petroleum products. Petroleum benzines require approximately 40 volumes of air, whereas the heavy petroleum products require approximately 100 volumes of air for complete combustion.

Petroleums, gas oils, and lignite tar oils readily lend themselves to gasification and they leave practically no residue, giving them peculiar value in an oil engine. Anthracene and creosote oils gasify fairly well. An oil, to give best results in a heavy-oil engine, should on heating show a tendency to volatilize suddenly at some given temperature and not to give off vapors regularly and uniformly, that is, distill with the rise in temperature. To this tendency to sudden volatilization or explosion, in contradistinction to regular volatilization or uniform distillation, is due the value as a fuel in the heavy-oil engine (unlike the explosion engine fitted with carburetor and igniter where the time of combustion is so short).

The following oils and mixtures of them have been used successfully in heavy-oil engines, provided they were mobile, free from free carbon, grit, and water, and were low in sulphur:

Peroleum products: Gasoline; lamp oils of all kinds; naphthas; gas oils; fuel-oil distillates; "masut" or residues from the crude oils of Russia; and crudes, if mobile.

"Steinkohle" oil products: Heavy oils; anthracene oils; and tar oils.

Bituminous oils: Retort oils of all kinds.

Lignite oils: Benzene; solar oils; paraffin distillates; and creosote oils.

Turf oils: Creosote oils.

Shale oils.

Vegetable oils: Peanut oil; cocoanut oil; castor-bean oil; cottonseed oil; and palm-seed oil.

Animal oils.

Alcohols.

Wood oils: Creosotes.

Any fuel that will flow freely can be burned in a heavy-oil engine. Though this in a measure is true, heavy tarry oils, if not kept perfectly fluid by heating, will cool and tend to clog the pipes and valves. It is advisable, therefore, to first subject the tarry oils to a distillation, distilling over everything up to the tar residues or even to the cokes, and to use this distillate for fuel without further treatment. The cost of distillation will be outweighed by the more satisfactory running of the engine.

When the fuel oil is heavy and contains little volatile material, it is advisable to inject alongside the main fuel spray, by means of an auxiliary spray, a small quantity of an oil having a relatively low flash point, such as a heavy benzine or a "gas oil." This ignition oil, igniting at the proper moment, will in turn ignite the more sluggish fuel oil, and proper ignition will thereby be insured. The ignition oil may also be injected within the fuel valve or first blended with the fuel itself in the storage tank.

Conclusion.

The heavy-oil engine can not yet be considered as fully developed and much work remains to be done in perfecting it. With the present imperfect knowledge of what the engine is capable of doing, and of what particular oils can be successfully used in it, one can not speak conclusively as to definite specifications for fuels, and for lubricants, and those outlined above must be considered, therefore, as tentative.

But the fact that petroleums containing as high as 20 per cent asphaltum as well as oils from tars have been successfully used is most encouraging. The future of the engine, and also a more efficient utilization for asphaltum liquid fuels and coal and wood by-product liquid fuels is assured.

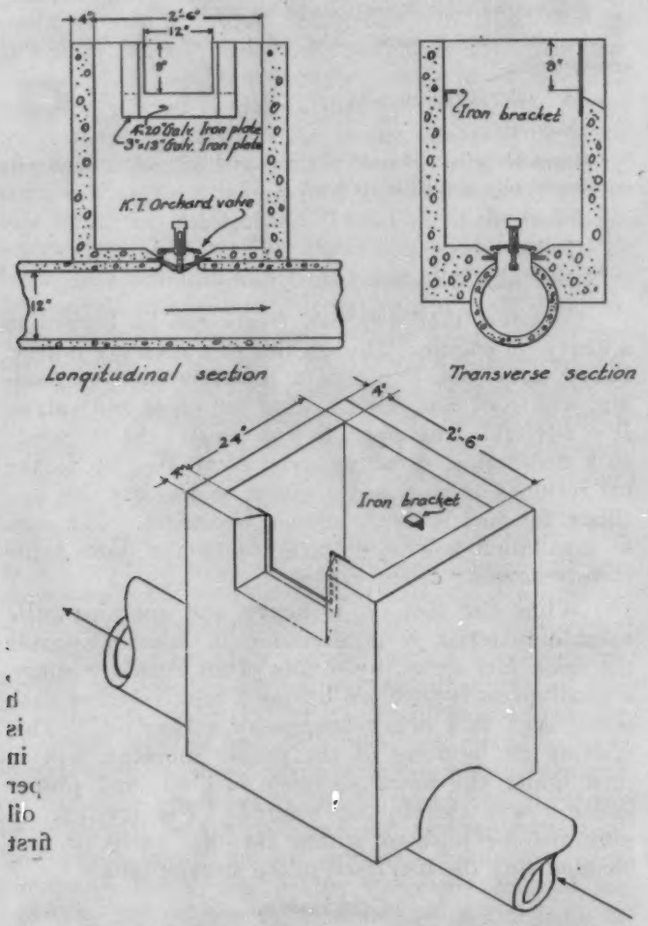
ELECTRICAL PUMPING AND IRRIGATION

MEASURING DEVICES.

BY B. A. ETCHEVERRY.

Weir Box and Take out From Pipe Line Under Pressure.

Where the water is carried in a pipe line under pressure the water must be delivered through a valve connected to the pipe. A good type of measuring weir box will consist of a rectangular box placed around the valve, with the measuring board placed at the top of one side of the box. The accompanying drawing shows a form of measuring box very similar to those installed on the cement pipe lines of the irrigation



Isometric Sketch and Sections of Typical Weir Box for Valve Take Out from Pressure Pipe Line. Kamloops-Fruitlands Irrigating & Power Company, British Columbia.

system of the Kamloops Fruitlands Irrigation & Power Company near Kamloops, B. C. It consists of a concrete measuring box placed around a takeout valve cemented to the pipe line. The valve is obtained from the Kellar & Thomason Manufacturing Company of Los Angeles. It is cemented over a hole cut in the cement pipe and regulates the flow in the box. The box is rectangular, made of four concrete walls 4 in. thick, reinforced with strands of barb wire. A notch is formed in one side wall and a rectangular weir plate made of galvanized iron strips is cemented in. To measure the depth of water above the crest a metal bracket is cemented in the wall opposite the weir opening and at the same level as the weir crest. The water which passes over the crest discharges into the irrigator's flume or ditch. In case of an earthen ditch it is necessary to prevent erosion or washing away of the soil by the falling water, by providing a receiving box or basin or by protecting the soil with paving. Some irrigation companies in Southern California simplify the construction of the weir boxes by using in place of the rectangular box, two or more sections of large size cement pipe placed vertically around the valve. The weir is formed by cementing a weir plate in a notch cut in the upper part of the pipe.

Miners' Inch Board or Box.

The method of measurement associated with the miners' inch unit has many advantages.

1st. The irrigator can tell at a glance how much water is being delivered. It requires no computation or reference to tables.

2d. It is well adapted to measuring small volumes of water and is fairly accurate if properly carried out.

3d. The flow through a miners' inch board is affected much less by a change in water level than the flow over weir. A 10 per cent rise of water level will increase the flow over weir by 15 per cent while with a miners' inch board the flow is increased only 5 per cent.

The disadvantages are:

1st. The device is not adaptable to large volumes of water because the required length of the orifice may be too great.

2d. Unless the conditions necessary for accurate measurements are carried out, the results obtained may be very inaccurate.

A miners' inch board consists of a board in which one or more orifices have been made through which the water is measured by maintaining a constant head over the center of the orifice. The head usually ranges from about a minimum of 4 in. to a maximum of 8 in. The California miners' inch as used in Southern California requires about a 4 in. head and gives about 1/50 of a second foot. The British Columbia miners' inch requires about an 8 in. head and gives 1-35.6 second foot. When more than one orifice is used they are made of different sizes so that different volumes of water may be measured. When only one orifice is made it is usually a long orifice made adjustable and regulated with a slide. To obtain accurate results the jet coming through the orifice must touch only the upstream edges and clear the downstream edges, so as to discharge freely into the air. With a board 1 in. thick if the corners are sharp, it is not necessary to bevel the edges or use thin metal plates. To measure a large volume of water the length of the orifice, if the orifice is only 1 in. high, will be excessive. To

avoid this the orifice is frequently made, 2, 3, 4 or even 5 in. high. This will affect the accuracy, especially when the required head on the center of the opening is small. A miners' inch board may be fitted in a box constructed about in the same manner as for a weir board. To obtain accurate results at least 6 in. must be allowed on the upstream side of the board from the lower edge of the orifice to the bottom of the ditch or floor of the box into which the board is placed, and at least 2 to 4 in. from the ends of the orifice to the sides of the ditch or box. On the downstream side the jet should discharge freely into the air.

To obtain a constant head on the orifice a fairly successful device is known as the Foote measuring box. It consists of a section of flume divided into two compartments by an overflow crest wall placed in between and parallel with the sides of the flume section. The compartment which is on the same line and forms part of the supply ditch is open at both ends and the flow can be checked or regulated by flashboards. The other compartment forms the box from which the water passes through the orifice in the side wall. The flow into this box is regulated by a gate and the excess passes over the crest of the overflow wall back into the canal. The crest of the overflow should be above the center of the opening a height equal to the required head and it must be of sufficient length to dispose of the excess without increasing the depth of water to a great extent.

The use of an overflow to regulate the head on the opening is applied in Southern California to miners' inch boxes for takeouts from pipe lines under no pressure much in the same manner as the Foote measuring box; the form of box is described further in connection with cement pipe systems.

Submerged Orifice.

A submerged orifice consists of a channel or flume section in which are placed one or more gates and the orifices are formed by raising the gates. The discharge is measured by obtaining the size of the opening and difference in elevation of the water level upstream and downstream. As generally constructed the floor forms the lower edge of the orifice. This suppresses the contraction on the bottom. When more than one gate is used, unless the openings are sufficiently separated, they will affect each other and will tend to suppress contraction on the sides. For these reasons the formula for submerged orifice with full contractions will not give accurate results and must be modified. Experiments made in the Imperial Valley give approximately the following equation:

$$Q = .7\ A\sqrt{2gh}.$$

Where h = difference in elevation in water surfaces: A = total area of opening.

The advantages of submerged orifices are that they can be used for water carrying silt and do not require a large loss in velocity head.

Special Measuring Devices.

The Grant Michell meter is known as the Australian meter, having originated in that country. It consists of a four-bladed fan fastened to the lower end of a vertical spindle which transmits the revolution of the fan to a gear box at the upper end. This mechanism is suspended from a cast iron bracket over a wrought iron orifice plate placed below the canal bed and built or bolted down into the downstream part of a box divided into two parts by a baffle wall open at the bottom and extending above the water surface. The water passes down through the opening and imparts a rotary motion to the fan. The gear box forms the recording device which consists of a series of dials giving a continuous record in acre inches and fractions or in cubic feet. The fan spindle and gear box are removable and portable and can be used for several boxes. The discharge depends on the size of the orifice plate and on the difference in elevation in the water surface upstream and downstream. The size of the meters is generally based on a 3 in. loss of head, but may be designed for less. The orifices range from 9 to 40 in. in diameter and are used for discharge of 1 to 20 cu. ft. per second. The serious objection to this meter is the high cost ranging from $60 for the smaller one to $250 for the larger one. These prices are the catalogue prices of Geo. Kent, Ltd., 199-204 High Holborn street, London.

Automatic registers give a continuous record of the quantity of water, whereas the volume of water delivered over weir or the discharge of a ditch flume or creek by measurements at a rating station or rating flume will vary with the fluctuations in the water level. These registers are of different types. They can, however, be classified in two classes. They all consist of a clock, a float and a cylinder or drum to which is fastened a sheet of paper on which the depth of water at different times is recorded by a pencil or pen.

With one class of register the cylinder is placed vertically and is rotated by a clock which gives it one revolution a week. The pencil is connected to the float which is placed in a well or box built on the side of the weir box or rating flume and connected with the water through an orifice. The fluctuations in water level cause a rise and fall of the float and a corresponding movement of the pencil which is recorded on the sheet placed on the drum.

The other class of register differs from the first class in that the cylinder is placed horizontally and is rotated by the float instead of by the clock and the pencil is carried parallel with the cylinder by connections with the clock. In each case the record obtained is the result of two motions which give an irregular line showing the fluctuations and giving the depth of water at any time. The various types of registers are illustrated and described in Bulletin 86, part 1, of the Office of Experiment Stations of the U. S. Department of Agriculture, Washington, D. C.

The cost of registers ranges from about $40 upwards and for that reason they are seldom used for the measurement of water delivered to irrigators. They are, however, of much value in the operation of a system when installed at the head of laterals.

WESTERN DISTRIBUTING LINE PRACTICE.

[The subject matter subjoined relates especially to the Western states, and particularly to the Pacific Coast, being the gist of a report by P. M. Downing, Markham Cheever, J. A. Lighthipe and L. N. Peart to the National Electric Light Association. Distributing lines are distinguished from trunk and transmission lines only in that the latter are used to connect important generating and distributing systems.—Editor.]

The past few years have brought about many changes in the method of transmitting and distributing electrical energy for power and lighting purposes. Voltages which a short time ago were not considered commercial possibilities are today being used not only on long transmission lines, but very generally for distributing purposes. It has not been long since 40,000 or 50,000 volts were considered the maximum at which a line could be operated safely and economically.

The continually increasing demand for electric power has made necessary the use of voltages as high as 100,000 or 150,000 for transmission purposes, leaving the lower voltage lines which were once used as transmission circuits to be used almost exclusively for distribution purposes.

Another condition contributing to the use of the higher voltages is that the rates are being continually reduced, while the territory served is increasing. This condition has forced operating companies to adopt a construction the cost of which will be the minimum consistent with good service. Today there are a large number of companies operating general distributing systems in rural districts at voltages as high as 22,000.

Voltages higher than this can seldom be used to advantage except in the case of large consumers, owing to the high transformer cost. Where there are a large number of such customers whose requirements range from 1 to 15 hp., with only an occasional greater demand, a lower voltage can be used to advantage. Fifteen thousand and 11,000 volts have been adopted by a large number of companies, although 6600 volts are also being used in many instances. Forty-one hundred volts, being 2300 volts star connected, is perhaps the most satisfactory voltage for use in districts where the load is not great enough to make the copper cost prohibitive.

In deciding on the voltage to be used in any new territory, local conditions and the probable future demands for power will, to a very great extent, be the determining factor. The standard, and perhaps the best and most generally used voltage for cities and suburban territories is 4000, i.e., 2300 volts, star connected. Transformers of this voltage can be had at a minimum cost.

In the congested business centers of the larger cities direct current can sometimes be used to advantage. The only features, however, which recommend a direct current distribution over the alternating current are: (1) The more satisfactory operation of direct current motors, and (2) the ability to use storage batteries to improve the regulation and guard against interruptions to service. These advantages, however, are not so apparent now as they once were. The improvements which have been made in the operating characteristics of alternating current motors leave but little to be said in favor of the direct current apparatus. As a guarantee against interruptions to service, the modern steam turbine is much more reliable than the reciprocating engine. Many of the companies receiving energy from hydroelectric sources now realize the necessity of maintaining a steam turbine station for both reserve and regulating purposes.

Opinion as to the best connection to be used on transformers seems to be about evenly divided between the delta and the star. On lines up to 15,000, which is about the limiting voltage from which small services can be supplied economically, the star connection with grounded neutral seems preferable.

If a single-phase service is required, the neutral can, to advantage, be run out from the station to carry the unbalance. In the event of single-phase service being required in an isolated section only of the system at a considerable distance from the station, and where the expense of carrying the neutral the entire distance from the station would not be justified, an artificial neutral may be established locally. By keeping the load in the district reasonably well balanced between the three phases, only the unbalance would be carried through the ground. From an operating point of view, there is no objection to carrying this unbalance through the ground. Objection is, however, sometimes raised to this method of operating by the telephone, telegraph and signal companies on account of inductive interferences with other circuits in the immediate vicinity of the power lines.

The type of construction used on distributing lines has not changed to any great extent during the past few years. For the lower voltage circuits, i.e., those operating at not more than 22,000 volts, the single flat-arm construction has been most used. Where it is desired to carry two circuits on the same line of poles, either of two constructions can be used: (1) The conductors of the two circuits may be supported on two arms to form two triangles on opposite sides of the pole; or, (2) the two conductors may be placed in the same plane either vertically or horizontally. A safe and thoroughly substantial construction for the very high voltage lines can be had by supporting the two circuits on suspension insulators in vertical planes on the opposite sides of the pole.

For voltages up to 22,000 the pin type insulator has proved very satisfactory. From this voltage up to 60,000, both the pin and suspension types have been used. For voltages above 60,000 the suspension type is used almost exclusively. The objection to the use of suspension type insulators on voltages between 22,000 and 60,000 is the greater first cost. This, however, should not always be the determining factor in deciding the construction to be used on a line, especially if the service is important and is to be supplied by a single circuit. On the Pacific Coast and particularly in the sections where the salt fogs are prevalent, the suspension type of insulator is to be recommended. The reason for this is that it has fewer air pockets in which dust and dirt can collect. During the months from June to November there is little if any rainfall, with the result that considerable

dirt accumulates on the surface and under the petticoats of the insulator. The salt fogs or rain coming into contact with this dirt form a leakage path which is very apt to cause trouble. The fogs are worse than the rain, as practically the entire surface of the insulator will be wetted without washing off any of the dirt, whereas with the rain the top and outer portions of the petticoat are washed clean and the inner parts are left fairly dry.

The only way to overcome this trouble is to clean the insulators by wiping them. In some sections this dirt and salt fog condition is so bad that even the telephone and telegraph circuits become at times inoperative until the insulators are cleaned.

A large portion of the suburban business consists of reclamation, irrigation and small domestic motors. To give service of this kind requires a comparatively large mileage of lines per horsepower of connected load. To keep the investment down to a point where the business to be had would justify the first cost of the installation, it has been necessary to construct lines at a minimum cost. A very satisfactory construction consists of 30 or 35 ft., round, white cedar poles, spaced 15 per mile, with the three conductors carried in a horizontal plane at the top of the pole.

Very often, where the load is small and the voltage regulation is not of too great importance, a considerable saving can be made by the use of iron wire, instead of copper or aluminum. This has been found to give equally as good service as the more expensive conductors, providing, of course, it is not overloaded. Outside of cities and communities, where the use of insulated wire is required by ordinance, it is the almost universal practice to use bare conductors. Service wires leading into buildings are always insulated.

Of late years there has been a strong and growing tendency for legislative and other governing bodies to regulate line construction details. A number of states have done this by direct legislative enactment, while others have vested that authority in commissions having control of public utility affairs.

In California where the State Railroad Commission has control of all public utilities, the specifications for overhead crossings for electric light and power lines over railroads, street railroads, telephone and telegraph lines, etc., as adopted by the National Electric Light Association, have been accepted for crossings of lines carrying voltages of 15,000 and over. A compliance with these specifications will, in some respects, improve the crossing construction, but it is believed by many engineers that certain changes could be made that would materially lessen the first cost of the crossing without in any way impairing its efficiency.

Line extension estimates are generally made on the supposition that the gross revenue for the first three years will equal the cost of the investment. In some instances, however, when the extension is into new territory, where there is a probability of other business being developed, or where the demand is large and is to be supplied on long-term contracts, the investment can be made on a more liberal basis. In other words, the extension might be made on the basis of the gross revenue for five or an even greater number of years equalling the investment. Sometimes the customer is required to advance a portion or all of the first cost of the extension and have it rebated to him: (1) within a certain fixed period of time; or (2) on the basis of a certain percentage of his monthly bill to be refunded.

Arrangements of this kind are oftentimes very satisfactory when made with customers whose requirements will ultimately be large, and who, perhaps, should have the benefit of the lower rate for their present small demands. The percentage of the power bills rebated averages from 20 to 25 per cent.

ELECTRICITY FOR IRRIGATION.

The San Joaquin Light & Power Corporation has recently extended its transmission lines to serve the rich agricultural and oil districts of the coast counties of California. In this territory electric pumping for irrigation is comparatively new. Alfalfa as an adjunct to range feeding of cattle is attracting much attention and many new installations are being made.

The Golden Eagle Creamery, near Santa Maria, have harnessed two wells which are used for irrigating alfalfa at two levels. Water is put onto the tracts by means of flumes, one above the other. The first lift is 12 ft. into the lower flume to irrigate between 75 and 100 acres, while the upper flume is a lift of 27 ft. and irrigates an additional 100 acres. Formerly the wells were pumped by steam and a windmill was also used, but the cost was so high that the plant had to be shut down to await the arrival of electricity. A 30 h.p. motor has since taken the place of the 70 h.p. steam plant. The big creamery operated on the ranch is electrified throughout and a 7½ h.p. motor gives sufficient power. A 3 h.p. motor has also been installed for domestic purposes and general farm use.

An electrical research laboratory has been established at the Massachusetts Institute of Technology under the direction of Dr. Harold Pender. A grant of $10,000 a year for five years has been made by the American Telephone & Telegraph Company, another anonymous donor having pledged $5000 yearly toward the expenses of an investigation of the distance to which a street car passenger can be carried at reasonable profit for a five-cent fare. The New Haven roads have also contributed $2000 to be used in studying freight handling. During this summer investigations are being conducted on the phase relations of harmonics in sound waves as affecting the clearness of telephonic speech and also on the "skin effect" in alternating current transmission.

Electric purification of swimming pools is said to be a success in England. The bacterial contamination from hundreds of bathers in fresh water pools is neutralized by the addition of electrolyzed sea-water. By adding 30 gallons of the sterilized water, costing thirty cents, to an 85,000 gallon pool at three-day intervals the water is kept clear and free from noxious bacteria.

AN IMPROVED INVENTORY SYSTEM.

BY E. I. TITLOW.

An inventory of a public utility property contains information of direct value to the construction and operation departments of a company if put into suitable shape. An intelligent compilation and management of data collected by field parties greatly enhances its value to the company as it can be made to serve many purposes besides a mere physical valuation.

A general map of a transmission line from power plant to substation can be made to show many facts. By supplying field parties with black and white prints or slightly bleached blue prints mounted in portable book form, many notes and sketches can be made in the field and subsequently used in the office.

Pole Lines.

Poles should be numbered and the field party of linemen, chainmen and draftsmen should be required to note all places where the size of wire changes, checking with a lineman's calipers. Conditions of covering, size of pole top, and make of transformers should also be reported, the draftsmen making a sketch of the pole top, the party not leaving the pole until all data is gathered and recorded. Some such table could well be followed:

Pole number (to be recorded on the map, showing lengths and sags).

Height and size of top.

Condition as to paint, gains and butt decayed and split.

Trim as shown on the pole top sketch, showing also circuit numbers, transformers, but not services, which may be better taken by another party who will also gather the meter information.

As meters and transformers are often moved about they should each be given a card showing their number (serial) and location on a certain date with blank space left for movements. Then there should follow all data, including date of tests.

A transformer card should be made out similarly, showing in addition the maker's name, the rating and all primary and secondry taps, also dates of change of oil. Another party had better follow for arc lamp and company telephone.

Substation Buildings.

A distinct gain in clearness may be made in the inventory sheet by giving the apparent percentage of the present value of building and equipment in terms of replacement value when equipped with new and up-to-date apparatus. It should be stated that with a modern system the station might be omitted altogether, if such were the case. Such an opinion or general statement would serve as a heading or synopsis of the whole situation at this place, and these headings could be used as the basis of a quick, approximate valuation of the system, and would save clouding the inventory with a mass of figures and data without break or headings. It is a well known fact that these off-hand opinions have proven remarkably correct.

Following the off-hand opinion, the quantities for the building may be kept separate from the equipment. Here the labor unit prices for construction should be settled in the field, as many questions regarding distances, cartage and kinds of excavation may be decided by the older members of the operating crew better than they can be later on in the office.

Large openings in thick masonry walls should be noted in the field with the qualification that the work around them was ordinary, when about two-thirds of their size may be deducted, smaller openings not being deducted at all. Notes as to obsolescence of building should be made here. Excessive care in sizes of foundations is time wasted when engineers cannot agree on labor prices.

Equipment.

No graver mistake can be made in the field on important apparatus than to omit name-plate data in the hope of hurrying the field work. The writer has seen as many as five men go over the same apparatus with all the labor of unboxing and reboxing, each man looking for information along a different line. In fact, throughout the whole inventory, time will usually be saved and questions forestalled by a thorough exposition of condition and data on apparatus. In addition the company will then have office records which will be of great value when properly indexed. A wide-awake company will take advantage of the handling of stock to enlarge the stock shelves and give the inventory party a chance to put like material together and in an accessible form. This will enable the construction engineer to have stock shipped out promptly and correctly without ordering new material, as he would undoubtedly prefer, knowing that he will get, in the latter case, exactly what he wants and without sending his foreman to get out the stock for shipment.

Underground Material.

Profiles of the streets are necessary in order to show the depths and kind of ground excavated. Depths may be taken at the street corner as sufficient and in the case of electric conduits the manholes will show the exact condition. In many cases pipes were originally laid in early days through hilly streets which have since been graded so that the replacement excavation would be much less than the original excavation. Such profiles are necessarily made to a larger scale vertically than horizontally and show pipes which are round as vertically elongated (ellipses instead of circles).

Cross sections of the streets traversed by the company's mains will usually be too expensive to make and their only purpose would be to show how crowded the street was when extensions are to be made which work cannot well be made part of an inventory.

Maps should show the length between Tee points of each size of pipe and the accompanying profile show the depths. It is then always easy to summarize the length and depths of each size of pipe.

Conduits.

The same procedure will best show the number of ducts and where they change and the profile will indicate the material of the ducts, whether concreted or not, and the kind of ground, as well as referring to the manhole drawings which the company will have on file.

On these maps, notes can be made of the condition of underground pipes and electric conductors, for which some measurements of insulation resistance must be made to give an idea of whether the cables have been "cooked" by excessive loads in the past.

Manholes and Subway Type Transformers.

Flooding marks can usually be detected and the kind and condition of the manhole sump should be noted, as in a sandy valley the sump should contain a return check against flooding from the water in the soil. These factors should be noted for obsolescence, as well as the strength of the covers and supports for carrying the increasing weight of traffic.

Plan of Reports.

As on the overhead work, the clearest results will be obtained and possible questions anticipated by platting on a map the mains and transformers first by one party and leaving the services to a second party who should wait until they receive the maps and profiles from the first party, which can carry these along when getting the services. Their work will thus be in the nature of a check on the first party.

Determination of Unit Prices for Material and Labor.

A system should early be adopted and carried to a somewhat elaborate scale by properly cataloguing and indexing so that all clerks and questioners may find it of ready access.

Tables of all probable sizes of poles, cross arms, pins, insulators and clamps, bolts, steps, braces, anchors, strain-bobs and guy wires, should be made up in advance and their prices obtained by the office while the field party is marking them on the maps.

Wire tables for copper wire should show the deterioration of the insulation between new and bare as follows:

New—100 per cent for all sizes.

Good—probably 98 per cent in the larger sizes to 90 per cent in the smaller sizes.

If frayed so as to defeat the purpose of weather proofing (namely to offer a covering from which a lineman might have some protection when standing on a dry pole and from bare telephone wires falling across the line, as well as from wire of the same polarity but of different circuits swinging together in a high wind) it may well be given a value of 65 per cent in the larger sizes to 50 per cent in the smaller sizes (which is practically bare wire value).

This assumes that when the insulation becomes frayed, it must be removed to storage until it can be strung in some district where bare wire is allowable.

Tables for aluminum wire will take into account the fact that the scrap value is very much less than in the case of copper due to the soft metal suffering more damage in handling than copper.

Transformers.

As stated above, transformers are moved about and should be tabulated each on its own card with location on that date. The company's contract with the manufacturer will give prices new and deterioration should be only slight if the oil has been changed often enough. An inspection should show this from the formation of sludge around the conductor. Tables of unit cost of excavation in the various soils reported by the field parties should show excavation with and without backfill; in the latter case, allowance being made for a certain haul to dump. As this haul varies the figures cannot always be checked by questioners.

Tables of depositing concrete with both earth and wooden forms in small and large masses can be agreed upon in the office and freight rates looked up to the points where the field parties are getting the quantities.

Tables of steel work costs both in light and heavy sections can also be agreed upon and freight rates on long members looked up.

Brick work tables for the towns encountered will take into account the local wage for brick layers and hod carriers as well as freight from the nearest brick yard.

Probably only a few other building material tables should be made as the kinds are usually very numerous.

Piping and valve tables are a necessity and the field party should return with full information as to brass or iron body valves outside or inside screw, and gate or globe.

Steam pipe flange can be made up in advance from a study of the kinds of joints in the power house. Large pieces of machinery are usually matters of permanent record in the offices of the local agents and the only difficulty is obsolescence. To determine this latter point, it is only fair to adhere to the policy of the company, as some companies have found by bitter experience that a conservative policy will interrupt their service less than one of continual change.

Summary.

The most important points to be watched for are that the records should be left in a usable shape; for instance, a civil engineer should not be given the task of cataloguing the electric machinery; similarly a surveyor should take all distances and levels; and the drafting office should be allowed ample time to get all maps complete and up-to-date. One of the strongest points I would make is that these maps and profiles should take the place of the tabular form of notes; for instance, a set of symbols can be prepared which may be written alongside of each pole on the map, thus indicating in a concise manner the height of pole, number of cross arms, and kind of insulators, as well as the sizes of wire up to the point where they change. This latter is the difficult part on a small scale map and it is really foolish to try to save paper and get the figures so small that they cannot be read in the dirt of the fields.

In addition, if the company has not a diagram of their circuit arrangement, this is the time to make one of a large scale and put alongside of each line a sketch of the pole trim turned in by the field party. Such a sketch should be made for each type of pole, showing the number of circuits, pins, insulators, etc. In no other may can the data obtained be shown so clearly as on these maps and diagrams. They are in addition more likely to be kept up to date after the valuation engineers have departed.

JOURNAL OF ELECTRICITY
POWER AND GAS

PUBLISHED WEEKLY BY THE

Technical Publishing Company

Rialto Building, San Francisco

E. B. STRONG, President and General Manager
A. H. HALLORAN, V. P. and Managing Editor
ROBERT SIBLEY, Treasurer and Editor in Chief
C. L. CORY, Secretary and Special Contributor
A. M. HUNT, Director and Special Contributor

On Library Cars of all Southern Pacific Trains.

TERMS OF SUBSCRIPTION

United States, Cuba and Mexico	per year,	$3.50
Dominion of Canada	" "	3.50
Other Foreign Countries within the Postal Union	" "	5.00
Single Copies, Current Month	each	.25

NOTICE TO ADVERTISERS.

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advrtisers should mail copy at least thirty days in advance of date of issue.

Entered as second-class matter at the San Francisco Post Office as "The Electrical Journal," July, 1895.
Entry changed to "The Journal of Electricity," September, 1895.
Entry changed to "The Journal of Electricity, Power and Gas," August 15, 1890.
Entry changed May 1. 1906, to "The Journal of Electricity, Power and Gas," Weekly.

FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Municipal ownership of various public utilities is now engaging the attention of several Western cities.

Municipal Railways at San Francisco

In San Francisco, for example, the voters are soon to pass upon a bond issue of three and a half million dollars to construct several competitive municipal lines. The campaign "for and against" is typical of that which has been waged in each of the other Pacific Coast cities and which undoubtedly will continue to be waged until the millenium arrives, when this beautiful ideal will become a practical reality. A brief analysis of the situation is instructive.

The arguments in favor of municipal operation are founded upon the inadequate service of the United Railroads, the private corporation, and the adduced success of the Geary Street Railway, the municipal line. The opposing contention is based upon the dangers of new bond issues and the alleged failure of the Geary street line.

As to past inadequacy of service no question can be raised, though there are certain extenuating circumstances. Chief among these is the prohibitive restrictions which the city has imposed upon extensions. No matter how good may have been the intentions of the company, new capital cannot be raised because of the limitations of its earning power to a short franchise term.

The Geary street line has been operated for such a short time that a determination of its success or failure cannot yet be made. Conflicting figures are presented by either faction to prove their respective contentions, one making no allowance for general expenses, taxes, maintenance or sinking fund, thus showing an apparent profit, whereas the other claims an equal loss when these items are included. Such debasement of the public press is one of the most degrading exhibitions of private greed in the annals of journalism. Neither side is fair and both are trying to create prejudice. Under able management and loyal patronage the new road from the ferry to the ocean beach should show good earnings.

The real question at issue is whether it is for the greatest good of the city to build competing municipal lines. Instead of bickering over bitter differences of opinion about municipal ownership would it not be better for both city and company to co-operate in providing the facilities of which the city is so sadly in need? Far more can be accomplished through co-operation than by competition. Co-operation requires mutual concession and is impossible where politically-bred prejudice exists.

The intelligent investor recognizes the benefits of municipal ownership under private operation, the conservative citizen admits the reasonableness of fair return to capital, but the corrupt politician confounds these beliefs and tries to exact tribute from the investor and force political operation of public utilities upon the citizen. It is only necessary for the two sides to get together without bias and agree upon the greatest good for the greatest number.

Municipal operation of any utility discourages private investment in other utilities and thus retards the natural growth of a city. Furthermore it reduces

the general wage and the number of wage earners, which is primarily dependent upon the investment of capital in the city. Though a labor union may set an artificial wage standard for the municipal employe, all other wage-earners are injured when private capital is discouraged as previously demonstrated in this journal by F. K. Blue. Competition between municipal and private operation of public utilities is destructive —co-operation is constructive.

The benefits of harmony are exemplified by New York City where the municipality and the corporations are building the subways together. Of the $337,000,000 which the new city-owned subways will cost, the city will supply $171,000,000 and the two street railway companies the remainder with the assurance that their investment will be protected.

Chicago, also, after many years of bitter and costly experience, has adopted a plan of resettlement of differences between the corporation and municipality which provides for city profit-sharing in traction earnings and ultimate municipal ownership with fair interest and reasonable assurance to the investor. Municipal control is secured by a board of supervising engineers. At any time the city has the right to purchase the property, as all franchises are indeterminate.

The results in these cities have been brought about by a policy of conciliation. They are based upon the fact that a street railway, unlike a mine, is a continuing investment. It must continue operation irrespective of ownership; operation to extinction is out of the question. Other cities would do well to profit by their experience.

These suggestions are new only in their manner of presentation. They embody much from the report of Mr. Bion J. Arnold. On the basis that "advice is worth what it costs" it certainly behooves San Francisco to follow them. How much better is his suggestion of a regulated monopoly, where the city shares in the profits but is relieved from the responsibilities of operation, than the proposal to tax the earnings of a private company for the construction of a competing municipal railway! His investigation shows that 72 miles of single track should be constructed at once. Why cannot the city and the corporation do this jointly? How long shall prejudice retard the city's growth?

It is as much the duty of the public authorities to provide proper transportation facilities as to build schools or parks. Cheap and rapid transit improves the morals and the health of the people by permitting them to live amid better surroundings. As a reasonable return could not be earned on the investment of private capital in building the subways, New York lent a part of its credit in paying for their construction. Already the increased taxable valuation of outlying reality has more than justified the expense. Since the first subways were built the assessed valuation of the Bronx has nearly trebled, the annual cost of new buildings has increased five-fold and the density of population in the over-crowded districts greatly decreased. Adequate transportation is the first step in the enlargement of any city. Transit facilities must precede settlement.

Respecting the Expert

The Oregon Society of Engineers is trying to have a technical man placed upon the civil service commission at Portland. Engineers have been conspicuous by their absence on many of these boards as well as upon the various public service commissions through out the country. In a paper presented at the annual meeting of the American Institute of Electrical Engineers, Dr. William McClellan suggested the formation of a general engineering society, one of whose functions would be promoting engineering participation in national and civic matters. Lack of unity among the engineers is largely responsible for the low standing that the engineer occupies among the learned professions but far more fundamental is the prevalent lack of respect for expert opinion.

Indeed, so eminent an authority as Hugo Munsterberg, the psychologist, has ascribed this lack of respect for the expert as the primary cause for foolish investments. It is characteristic of the American citizen to think that his opinion on any subject is as good as any one's. Amateur authorities prescribe for bodily ailments as readily as for political disorders. They consider their opinions as to the merits of an investment or the need of an engineering improvement as reliable as that of a banker or an engineer. This so-called independence, together with their carelessness, credulity and unreasonableness, make them the victims of the unscrupulous.

Such being the facts it becomes the obvious duty of the well informed to urge the people at large to recognize the value of expert opinion. Some one has said that it takes ten years to popularize a scientific truth through the ordinary channels of popular education. Popular skepticism, born of ignorance, is one of the most powerful brakes upon the wheels of progress.

But the age of the expert in public life has finally begun. Civil service in the many Federal bureaus has superseded political patronage and the influence of the engineer and the expert in every practical field is destined to control the American life as the ineffectiveness of amateur methods is demonstrated.

A New Lamp

Announcement is made of the development of a new incandescent lamp requiring but one-half watt per candle. The great innovation is the use of an inert gas, such as nitrogen, instead of a vacuum in the lamp, together with a specially shaped tungsten filament. The improvement has been made by the research laboratory of the General Electric Company and is a strong argument in favor of such research work. The first applications will be in units of large candle-power for out-door illumination.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

George Boring, sales manager, Portland branch Pacific States Electric Company, is in Seattle, for a few days.

C. H. Alexander, manager Butte, Montana, office General Electric Company, is spending his vacation in Seattle.

C. E. Spaulding of the General Electric Company, Los Angeles, spent the latter part of the week in San Francisco.

L. Heyneman, manager of the Pacific Coast branch Goldschmidt Thermit Company, has been at Los Angeles this week.

H. E. Sanderson, Pacific Coast manager for the Bryant Electric Company, is making a trip throughout the Pacific Northwest.

Harry T. Hays of the Mt. Whitney Light & Power Company, Visalia, was a visitor to San Francisco the first part of the week.

Alexander Rosborough, vice-president and general manager California-Oregon Power Company, San Francisco, was in Seattle, recently.

H. W. Reynolds, of Chas. C. Moore & Company's San Francisco office, returned this week from a two weeks' vacation in Sonoma county.

I. Irvadare, president of the Nippon Electric Company, Tokyo, arrived Wednesday from New York, leaving San Francisco on the 26th for home.

F. V. T. Lee, formerly assistant to the president of the Pacific Gas & Electric Company, and now a resident of Vancouver, B. C., is at San Francisco.

R. F. Behan of the Westinghouse Electric & Manufacturing Company, San Francisco, is spending a vacation at Pelican Bay, in the Klamath region.

Harold C. Biglin, Western Electric Company's sales manager at Denver, is spending a vacation in California and is due in San Francisco from Los Angeles, the coming week.

R. F. Monges, local engineer for the General Electric Company at Portland, Ore., has returned to Portland, from San Francisco, where he had been called by the death of his father.

Thos. Collins, sales manager of the Westinghouse Electric & Manufacturing Company, San Francisco, has recovered sufficiently from his recent illness to leave the hospital and make a daily visit to the office.

L. G. Brown of the lamp department, General Electric Company, left Wednesday evening for an extended trip east, during which he will attend the conference of the Sunbeam Lamp specialists at Cleveland, O.

R. M. Alvord of the sales department, General Electric Company, San Francisco, recently returned from a vacation trip, which it now develops has turned out to be a honeymoon trip. Congratulations to Mr. and Mrs. Alvord.

A. E. Griswold, president and general manager of the A. G. Electric & Manufacturing Company, and Mrs. Griswold, are making a trip by automobile from Seattle through San Francisco and Los Angeles to San Diego in the interest of the company's business.

W. S. Handbridge has returned from Chattanooga, Tenn., where he has been attending the National Electrical Contractors' Convention as delegate from the California State Contractors' Association. Mr. Handbridge reports a successful convention and brings the news that the 1915 convention will be held in San Francisco.

W. T. Maddex, assistant general manager of the Utah Light & Railway Company, in charge of the operation of the railway department, has tendered his resignation, effective July 15th. Mr. Maddox was division superintendent of the Pacific Electric Company of Los Angeles, with headquarters at Los Angeles, California, prior to his accepting the position with the Utah Light & Railway Company last November. He is returning to Los Angeles to look after his personal interests there. His broad experience and uniform courtesy and attention to the details of management which make for comfort and safety of travel have made him extremely popular in Salt Lake City.

George W. Manning has been appointed superintendent of railway service for the Utah Light & Railway Company, to fill the vacancy occasioned by the resignation of Mr. W. T. Maddex. Mr. Manning entered the street railway service in Salt Lake City twenty-two years ago as an extra man. For six years he served as motorman and conductor and received his first promotion as inspector in 1897. He has risen steadily through the various grades of service to the position of assistant superintendent, which he occupied at the time of his recent promotion. Mr. Manning has always been popular, both with the employes and with the public, and is receiving countless congratulations on his good fortune.

OBITUARY.

Mr. C. B. Smith and wife of Portland, Oregon, met their death on Mt. St. Helens on July 6th, while trying to descend the mountain in a snow storm. After continuous searching from the time they were lost until the 15th the mutilated body of Mr. Smith was found at the bottom of a 300 ft. crevasse. The neck was broken and one arm broken in two places. Mrs. Smith's body was found shortly afterwards. She doubtless perished from exposure and starvation. Mr. Smith was an assistant to the chief engineer of the Pacific Power & Light Company. He has been in Portland several years and both he and his wife were well known in engineering and social circles. They were active workers in the Rose City Park Club and were always willing to lend their support to any matter of public improvement. Mr. Smith was a son of Mrs. Emma Barnes Smith of Portland and the late Colonel Eliphos Smith. Mrs. Smith was the daughter of Professor John W. Newkirk of New York, and sister of Professor Burt L. Newkirk of Minneapolis, Minn. Mr. Smith was an associate members of the A. I. E. E. and the N. E. L. A. They are survived by a two-year-old daughter.

PIERSON, ROEDING & CO. MADE AGENTS FOR SAFETY INSULATED WIRE & CABLE CO.

The Safety Insulated Wire & Cable Company announces the appointment of Pierson, Roeding & Company of San Francisco, Los Angeles, Seattle and Portland, as exclusive selling representatives for the Pacific Coast, (effective August 1, 1913.) Mr. Ralph L. Phelps, manager of the Pacific Coast office for the past five years, has become associated with Pierson, Roeding & Company and will continue to personally represent the interests as manager of The Safety Insulated Wire and Cable department.

MEETING NOTICES.

Seattle Jovian League.

The Seattle Jovian League gave a special luncheon at the Rathskeller on July 18th. About 75 people were present, including invited guests. The meeting was held as a reunion among electrical men of the northwest. A special orchestra rendered appropriate music and a number of impromptu addresses were made by the invited guests. Among those from outside the city were H. W. Scott, electrical contractor, Astoria, Oregon; James F. Kinder, in charge station sales, Portland office, The Wise-Harrold Electric Company, New Philadelphia, Ohio; Mr. Squires of the Otis & Squires Company, San Francisco; Mr. Vandegrift, repre-

senting the Oakland Lamp Works of the National Lamp Companies; A. S. Moody, manager supply department, Portland office General Electric Company; Mr. Averill, manager Fobes Supply Company, Portland; Mr. Cleaver of the Granite Falls Electric Company, Granite Falls, Washington; Howard Gift of the Gift Electric Supply Company, Vancouver, B. C., and others. W. J. Grambs, president of the Northwest Light & Power Association, gave a talk on the forthcoming convention of the association at Seattle, September 3, 4, 5, and urged the Jovians to cooperate in every way not only to make the convention a success but to make the rejuvenation to be held during the convention a notable affair. Burton R. Stare, statesman of the Seattle Jovian League, talked on Jovianism in Seattle, discussing its benefits not only as a matter of sociability, but as an adjunct to business. He also urged that extraordinary efforts should be made by the individual members as well as the League to get a large number of new members into the order at the September meeting.

ANNUAL CONVENTION PACIFIC CLAIM AGENTS ASSOCIATION.

The fifth annual convention of the Pacific Claim Agents Association was held at Vancouver, B. C., on July 10th, 11th and 12th, 1913. At the opening session Mayor T. S. Baxter made an address of welcome on behalf of the city, urging co-operation on the part of all. Mr. F. R. Glover, representing the British Columbia Electric Railway Company, welcomed the delegates on behalf of the only electric railway outside of the United States which is connected with the association. Mr. Carson, president for the past year, spoke of the good work of the association, calling especial attention to the conviction of the notorious Maud Myrtle Johnson and the arrest of the fakers, W. A. Ward and J. N. Case. Mr. E. H. Odell of Tacoma, whose membership in the association had been terminated by virtue of his retirement from service with the Tacoma Railway & Power Company, was elected on honorary member by unanimous vote.

In the discussion on "Workmen's Compensation and Industrial Insurance Act," the convention was honored by the presence of three of the state of Washington commissioners, namely, F. L. Daggett, A. R. Ernst and J. F. Gillies, who joined heartily in the discussions, Mr. Daggett submitting a paper and making pertinent remarks thereon. Mr. Daggett particularly emphasized the fact that the state of Washington were pioneers in the establishing of laws for the compensation of workmen. Spokane, Wash., was set as the place of meeting for the convention in 1914. The following officers were elected for the year 1913-1914:

President J. H. Handlon, United Railroads of San Francisco; First Vice-President, T. H. Aston, Washington Water Power Company, Spokane, Wash.; Second Vice-President, A. M. Lee, Northern Pacific Railway Company, Seattle, Wash.; Third Vice-President, G. N. Smith, O.-W. R. R. & Nav. Company, Portland, Ore.; Secretary-Treasurer, E. H. Odell, Tacoma, Wash. Executive Committee: W. H. Moore, H. G. Winsor, A. E. Beck, H. K. Relf, T. A. Cole, S. A. Bishop.

Annual Meeting of the Pacific Claim Agents Index Bureau, Held in Vancouver, B. C.

On the evening of July 12, the annual meeting of the Index Bureau was held at the Hotel Elysium. Mr. Boynton, president for the past year, called the meeting to order and read a report of the year's work in detail calling attention to the numerous names and clippings filed. It was suggested by Mr. J. H. Handlon of San Francisco that very beneficial effect might result from advertising the work of the Index Bureau. It was voted therefore to have placards made bearing the words "Members of the Pacific Claim Agents Association" and "Subscribers to the Pacific Claim Agents Index Bureau," these placards to be placed in the offices of the members of other organizations. Various matters of importance were discussed after which the following officers for the coming year were elected:

President, Geo. Carson; First Vice-President, B. F. Boynton; Second Vice-President, W. H. Moore; Secretary, W. H. Odell; Treasurer, H. S. Winsor. Board of Directors: T. G. Ason, C. N. Smith, A. E. Beck, T. A. Cole, H. K. Relf, J. H. Handlon. Seattle was selected as the headquarters of the Bureau for the coming year.

TRADE NOTES.

George H. Keep Company, Tacoma, have the contract for rewiring the Raymond hotel for a system of lights and return call bells.

The Pacific Electric Manufacturing Company, San Francisco, shipped this week to the Cerro Depasco Mining Company, Callao, Peru, eight outdoor electrically controlled, 60,000 volt oil switches.

James O'Brien, electrical contractor, San Francisco, has completed the electric conduit installation for the Panama-Pacific International Exposition. Over 85,000 duct feet of Orangeburg fibre conduit were used.

The Pacific Electric Railroad Company of Los Angeles, has awarded the Union Switch & Signal Company the contract for installation of a block signal on the Venice line and the Pasadena short line as far as Indian Village.

Davis & Hull, electrical engineers and contractors, Tacoma, have remodeled their offices and have added a stock of supplies for heating, cooking, etc., on account of the heavy demand for these devices since the new city rates went into effect.

The Pacific States Electric Company has recently increased the capacity of their electric truck delivery system, making a total of five trucks in all now in use. Two have been placed in use in Los Angeles, two in San Francisco, and one in Oakland.

William A. Mullins Electric Company, Tacoma, has the contract for remodeling the wiring in the Horgan-Parks department store and has just completed wiring the Ruston city hall. In connection with the last job an electric fire siren was installed.

Lyman J. Maass, an employe of the city at the Interlake avenue substation, Seattle, was killed recently by an electric shock. Maass was a junior in the University of Washington, and was taking the course in electrical engineering. His father resides in Los Angeles.

The Seattle Construction & Dry Dock Company has a contract to construct a 250 foot ocean going yacht for J. E. Jackling of Salt Lake City. Same will be equipped with a 20 kw. generating set and complete storage battery. It will also have a complete telephone system as well as wireless apparatus.

S. H. Couch Company have recently established an agency in San Francisco for their autophone and intercommunicating telephone systems. The autophone system is particularly adaptable to hotel, office and factory use, the switchboard being automatic, the switch being made by the speaker at the time of using the receiver and is a simple and rapid system.

The A. G. Electric & Manufacturing Company, Seattle, has completed what is probably the largest front connected panel and cabinet job in the city for the Post Intelligencer to control the printing presses and the general power and lighting of the building. This company has also completed a monogram announcement panel for Pantages theater at Edmonton, Alberta, and another for Pantages theater at Portland

FINANCIAL NOTES.

The appointment in New York of Albert H. Wiggins, F. J. Close and R. H. Rhett as a protective committee for the holders of the $1,618,000 three-year 6 per cent notes of the United Light & Power Company of California, interest on which was defaulted June 1, was announced this week. More than $1,000,000 of these notes were sold from the New York office of the Smith-Tevis-Hanford Company, so that the majority of them are held in the east and not in California. R. G. Hanford of San Francisco, president of the United Light and Power Company, said that the past due interest on these notes would be paid prior to the 30 day limit allowed by the indenture, which would be September 1, 1913, and that these payments probably would be made around August 1. It is understood that a majority of these notes have already been deposited. One of the principal assets behind these notes is the contract for the supplying of power to the San Francisco- Oakland Terminal Railways, and other Smith traction properties.

Directors of the Oakland, Antioch & Eastern Railway report that they have received subscriptions from stockholders of the company for more than $200,000 of the company's authorized bond issue of $1,000,000. The sale of the entire issue to their stockholders would relieve the necessity for the proposed assessment on stock.

The statement of the Mt. Whitney Power & Electric Company, for the month of June, shows gross earnings for the current year of approximately $500,000 and for the month, $49,574.14, a gain of approximately 19 per cent for the year and 33 1-3 per cent for the month. The net earnings show corresponding gains of 19 and 28 per cent respectively. The comparative statement rendered by the company follows:

Year ending June 30.	1912.	1913
Gross earnings	$414,605.00	$491,773.58
Operating cost and taxes	189,758.00	233,864.22
Net earnings	224,847.00	257,909.36
Month of June.	**1912.**	**1913.**
Gross earnings	$37,160.00	$49,574.41
Operating cost and taxes	17,004.00	23,600.08
Net earnings	20,156.00	25,974.33

The Utah Power & Light Company and its operating subsidiaries report earnings for June, 1913, and the 12 months ended June 30, 1913, as follows:

	1913.	1912.	Changes.
June gross	$ 144,070	$ 116,857 Inc.	$27,212
Net after taxes	93,222	56,412 Inc.	36,810
12 months gross	1,543,213	1,478,223 Inc.	64,989
Net after taxes	875,091	814,124 Inc.	60,967

Earnings of all operating companies, now operated or controlled, are shown for the comparative periods, irrespective of the dates of their acquisition.

For May, 1913, gross earnings of the Portland Light & Power Company increased but $6039 or 1.15 per cent, while net earnings decreased $1236. Owing to larger interest charges, the surplus for the month was $117,969, a decrease of $12,546, or 9.6 per cent. For the 12 months ended May 31, 1913, gross increased $250,993, or 3.9 per cent, while net increased $152,443, or 4.7 per cent. Interest charges were $210,539, or 13 per cent larger than in the preceding year, so the surplus for the 12 months was $1,571,879, a decrease of $58,096, or 3.6 per cent, from 1912. The surplus was equivalent to 6.3 per cent on the $25,000,000 capital stock, on which dividends of 1¼ per cent quarterly are being paid.

The California State Railroad Commission has denied the application of the San Diego Consolidated Gas & Electric Company to issue 3148 shares of its common capital stock of the par value of $314,800. The corporation applied for authority to issue the stock to pay the discount upon its bonds issued since March, 1909. The commission decided that the discount on bonds should be made up out of the corporation's income, prorated over a series of years, and should not be capitalized by an issue of stock. The commission states that it is its policy to authorize stock for additions and betterments to a corporation's facilities or for the purpose of paying indebtedness incurred in the construction of additional facilities. It finds, however, in the present case, that the San Diego Consolidated Gas & Electric Company desires to use the proceeds from the sale of the stock for the purpose of paying the discount upon its bonds. The commission finds that, in addition to its regular 7 per cent dividend, the San Diego Consolidated Gas & Electric Company paid an extra dividend in 1912 in the sum of $255,600, and that this dividend went to its stockholder, the Standard Gas & Electric Company. The commission finds, further, that the San Diego Consolidated Gas & Electric Company now owes to the Standard Gas & Electric Company a large sum of money, which it proposes to liquidate from the sale of the stock. The commission expresses the opinion that if the San Diego Consolidated Gas & Electric Company had used the large surplus in paying its debt to the Standard Gas & Electric Company instead of declaring it an extra dividend, it would not now be put to the necessity of seeking to capitalize its bond discount. The commission has, therefore, denied the application.

A statement of earnings and expenses has been issued for June, 1913, and six months ended June 30, 1913, by the Great Western Power Company system. For the month it shows a net income from all sources of $175.813.95 and a surplus increase more than double that of June, 1912. For six months the net income from all sources was $976,651.32 and the surplus was $408,299.94, as compared with a surplus of $251,-815.62 for the same period of 1912. The statement follows:

Month of June, 1913—	
Gross operating income	$ 226,819.10
Operating expenses and taxes	66,307.60
Net operating income	$ 160,511.50
Other income	15,302.45
Net income from all sources	$ 175,813.95
Bond interest	95.108.33
Surplus for month of June, 1913	$ 80,705.62
1912—	
Surplus for month of June, 1912	$ 37,221.85
Increase 1913 over 1912	43,483.77
Six months ended June 30, 1913—	
Gross operating income	$1,317,905.35
Operating expenses and taxes	426,356.07
Net operating income	$ 891,549.28
Other income	85,102.04
Net income from all sources	$ 976,651.32
Bond interest	568,351.38
Surplus for six months ended June 30, 1913	$ 408,299.94
1912—	
Surplus for six months ended June 30, 1912	$ 251,815.62
Increase 1913 over 1912	156,484.32

Much interest has developed in the effect of the failure of the Kuhn Banks in Pennsylvania upon the interests of this concern in Idaho. The American Water Works & Guarantee Company, the holding company for the Kuhn irrigation and electrical projects, was forced into the hands of a receiver with the failure of the banks. Mr. S. H. Hayes of Boise, former attorney general, who has charge of the Kuhn interests in Idaho, is quoted as follows: "There will be no receiverships for the Idaho companies for the excellent reason that none are necessary. In my opinion there will be no change in the affairs of the Kuhns in Idaho in any material degree." It is understood that most of their electrical projects there on a substantial operating basis, and barring extraordinary conditions, should be able to continue operations without regard to the difficulties of the promoters and principal stockholders.

NEWS NOTES

ILLUMINATION.

NEWPORT BEACH, CAL.—The city has given the Pacific Light & Power Company a 40-year franchise.

CAMAS, WASH.—Bids will be received until August 12th, for furnishing lights for the town as per specifications on file in the office of the clerk.

SMITHFIELD, UTAH.—Messrs. Alma Chambers and John D. Plowman are investigating the proposition of installing and operating a municipal lighting plant in this town. They are visiting Brigham City and other cities in the state where such plants are in operation.

MARTINEZ, CAL.—An application for a gas franchise has been filed with the board of supervisors by S. Waldo Coleman of the Coast Counties Gas & Electric Company asking for a permit to traverse the county roads in laying pipe lines. Bids for the sale of the franchise will be received by the supervisors on August 18th.

HAILEY, IDAHO.—Harry J. Allen recently returned from Chicago where it is reported he completed arrangements for the construction of an electric light plant in Hailey. The Beaver Falls Light & Power Company have promised to extend their lines to the town of Hailey but so far have not done so, and this proposed plant is being considered on account of the failure of the Beaver Falls Company to supply service to the town.

PALO ALTO, CAL.—Because of a doubt as to whether the commission has power to regulate wholesale rates the application of the Palo Alto Gas Company to fix the wholesale rates for gas furnished under contract by the Pacific Gas & Electric Company, has been dismissed by Commissioner Thelen. It will be taken up again by the commission after August 10, when an amendment to the public utilities act giving the commission jurisdiction over wholesale rates will be effective.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has filed suits against the city of San Francisco and the city of Sacramento in the U. S. District Court to enjoin them from enforcing the gas rates for the coming fiscal year. The rate in San Francisco was 75c per 1000 feet for gas and 90c in Sacramento. A temporary restraining order was allowed in each case by Judge Van Fleet, made returnable July 28. The company declares it is being deprived of property by undue process of law and wants a rate fixed by the court that will net an income of 10 per cent on the invested value. It is asserted that the San Francisco rate would give an income of only $476,217.

TRANSMISSION.

SALEM, ORE.—State Engineer Lewis during the quarter ending June 30 issued 114 permits for the appropriation of water, 15 being for the construction of reservoirs and the development of 14,000 horsepower. Among the important permits were those issued to C. B. McConnell and Leonard and Emery Cole, of Burns, who plan the reclamation of 54,000 acres of land in Harney and Silver Creek valleys with the waters of Silvies River and Silver Creek. B. T. McBain, of Oregon City, for the development of 12,000 horsepower on the Clackamas River. The Dry Gulch Ditch Company, of Richland, Baker county, has appropriated the waters of Eagle Creek for the development of 1600 horsepower, and B. F. Jones, of Roseburg, contemplates the development of 1000 horsepower with the waters of Siletz River in Lincoln county.

SAN FRANCISCO, CAL.—Commissioner Thelen held a hearing on the application of the Pacific Gas & Electric Company for leave to build a new transmission line between power house No. 5 and Nicholas ravine—a component part of its Bear River project. E. Clements Horst who had obtained an injunction restraining the Pacific company from interfering with the natural flow of Bear River was represented by Samuel C. Wiel, who said that the Horst company owns 2000 miners' inches of the natural water flow of Bear Creek for irrigation purposes, and fears lest the plans of the Pacific company will deprive their hop ranches of this water right. J. P. Jollyman, the Pacific company's engineer, explained that his company intended to install six power houses along the course of its Bear River canal, one at each point where there was a natural fall of 550 to 300 ft.

BOISE, IDAHO.—Judge Bean has set July 31 as the date of trial for a suit brought by the State Bank of Chicago against the Idaho-Oregon Light & Power Company, F. N. B. Close and a bank which has interested itself in power development. Properties valued at $3,319,000 are involved in the suit. They are located in Baker county, Oregon; Ada Canyon, Boise and Washington counties, Idaho and Malheur county, Ore., with dam and reservoir sites and water rights on the Snake River. It is alleged that the Chicago bank is trustee for $7,000,000 worth of bonds issued by the power company, the first installment of which fell due April 1, 1913, and that the power company failed to redeem the bonds or pay the interest. It is alleged also that the power company pledged 5000 shares of stock in the Boise-Payette Power Company and 500 shares of Electric Power Company of Idaho and 250 shares in the Interstate Light & Water Company to the bank in addition to the mortgage. Interest to the amount of $94,345 is claimed.

SAN FRANCISCO, CAL.—Advices have been received by District Forester DuBois that the permit to the Pacific Light & Power Corporation for extension developments in the San Joaquin drainage has been signed by Secretary of Agriculture Houston. The permit provides for a progressive development including the Big Creek basin reservoir with a capacity of 103,000 acre feet to be impounded by three dams; the construction of power houses Nos. 1 to 4, operating under heads of 2091, 1951, 1440 and 478; the construction of a reservoir of 25,000 acre feet capacity on the San Joaquin River, and three steel tower transmission lines 292 miles long to Los Angeles. The structures in the development are of the highest type of engineering design and construction; the dams are to be of cyclopean concrete; the conducts, which are entirely in tunnel, are to be concrete lined except in solid granite. The power houses are to be of the most modern steel and concrete construction. One of the chief uses of power will be to supplant the supply now generated by steam by the Redondo plant of the company, since power can be furnished very much more cheaply from hydroelectric sources.

TRANSPORTATION.

PORTLAND, ORE.—A new application has been filed by Geo. F. Heusner for a franchise to use a loop defined by Flanders, Tenth, Salmon and Fourth on the west side. He has abandoned his plan for an interurban line on Broadway.

ASTORIA, ORE.—The Pacific Power & Light Company has announced that it will extend its street car line to the eastern limits of the city and to the Hammond Lumber Company's mill, provided the city will improve Date street for a distance of about 3000 ft.

DAVENPORT, WASH.—The Washington Water Power Company, Spokane, is planning the construction of a power transmission line for supplying power and lights to the towns of Creston, Wilbur, Almira, Hartline, Coulee City and Ephrata by way of this town.

SAN ANSELMO, CAL.—The San Anselmo trustees have granted a street railway franchise to S. J. Norton, acting for the San Rafael & San Anselmo Valley Railway Company, which proposes to connect this town with Fairfax and San Rafael, giving all three towns a street car system. The San Rafael council has not yet granted the franchise.

SALT LAKE CITY, UTAH.—Manager Robert Anderson of the Logan Rapid Transit Company announces that the work on the southern extension of the road which was stopped at Providence a few weeks ago will be resumed in about three weeks, and that the road will be built to Hyrum at least this fall. Sixty pound steel will be used on this extension.

SEATTLE, WASH.—Superintendent of Public Utilities A. L. Valentine in submitting his annual estimate for 1914 announces that it will cost the city $338,608 to operate and maintain the three proposed municipal street railway lines, one of which is now under construction. The earnings of the three lines are estimated at an equal amount.

SEATTLE, WASH.—Work has been started on the car barns of the Grays Harbor Railway & Light Company at Electric Park in Hoquiam. The barns are to be of latest style, to have concrete floors, steel frames and concrete roofs. The ground dimensions are to be 105x110 ft. Barns will be ready for occupancy within two months.

SACRAMENTO, CAL.—Two electric passenger locomotives will be operated on the Oakland, Antioch & Eastern line between Sacramento and Oakland. Each of the locomotives has a horsepower of 1000 and is capable of drawing a loaded train of six cars at the rate of 60 miles per hour. Another feature of the new line will be the observation car Moraga, which will have observation compartments at both ends, and will be capable of running under its own power or as a part of a train.

SUISUN, CAL.—Obstacles to the construction of the Northern Electric Railroad between Vacaville and Fairfield in the way of right of way difficulties have been settled by compromise and grading will proceed. The condemnation cases of the Northern Electric against the Consolidated Pacific Portland Cement Company and the Tolenas Cement Company and the Tolenas & Tidewater Railroad were set for last week before Judge Gregory of Butte county. Instead of hearings on the cases, notices of dismissals were filed in the court.

SAN FRANCISCO, CAL.—Bonds of any denomination may be sold by the city to aid in the extension of the municipal railway system to the Exposition grounds, according to an opinion handed down by the City Attorney's office. While it was at first believed that the charter provision making it necessary to stipulate the size of the bonds in the call for the election precluded this, decisions of the Supreme Court have been found that show minor changes can be made. It is proposed by the administration to divide the $3,500,000 bond issue that the people will vote upon next month into bonds of various denominations, so that people with small savings can invest in them.

STOCKTON, CAL.—Byron A. Bearce, president of the Tidewater Southern Railroad, announces that all the poles for the overhead electric circuits have been placed between Stockton and Modesto, and that wire stringing will be started soon. It is the expectation of the Tidewater official that the road will be electrified within a few months, and the old steam equipment disposed of. Work has been started on the Tidewater Southern bridge across the Mormon channel at Pilgrim street and as a large force of men is engaged in construction work it will not be very long before the railroad company will be using its own tracks into Stockton instead of coming over the Western Pacific as at present.

TELEPHONE AND TELEGRAPH.

EDMONTON, ALBERTA.—The government of Alberta is contemplating the construction of about 2400 miles of rural telephone lines. It is estimated that approximately $2,000,000 will be spent.

CLOVERDALE, CAL.—It is announced that one of the first undertakings of the California Telephone & Light Company when it secures control of the Cloverdale Light & Power Company's lines is to extend the lines along Dry Creek valley and down the western side of the river into the Healdsburg section.

SALEM, ORE.—In an order dismissing a complaint filed against the Pacific States Telephone & Telegraph Company, by C. P. Bowman, the railroad commission holds that under the law it has authority to direct physical connection between telephone companies. The decision is considered important, as this is the main question raised by the Pacific States Telephone Company in resisting the complaint before the commission by the Oregon Hotel Company, in which the latter asks that the telephone company be made to give an exchange service in the hotel with the Home Telephone Company. Bowman and others own a small telephone line in Eastern Oregon and desired to have the Pacific Telephone Company exchange service with it, but the commission dismissed the complaint on the ground that the particular connection requested was not public necessity.

WATERWORKS.

RED BLUFF, CAL.—Surveyors are making plans for a water system for Chino, having as a supply the north end of the Cone ranch and Antelope Creek and will pipe water a distance of 35 miles.

ABERDEEN, WASH.—A mortgage of $300,000 to J. O. Stearns as trustee was filed at Montesano in connection with bonds recently put out by the Hoquiam Water Company. The mortgage covers the water plant of that city and between 3000 and 4000 acres of land. A large part of the bonds will be used in extension of the system.

SANTA MONICA, CAL.—At a meeting of citizens and councilmen, it was decided to abandon the plan to create a municipal water plant by units, beginning at the southern end of the city, and instead to purchase two modern fire engines, one for Ocean Park and one for Santa Monica proper. The proposition of a municipal water system will probably be put up to the people in a bond issue.

SEATTLE, WASH.—The city utilities committee of the city council will introduce a bill transferring $80,000 from the 1911 Cedar River water supply extension fund to the 1915 fund of the same title in order that the city may proceed with the construction of a portion of the tunnel beneath the government canal near Seventh avenue northeast, which will carry city water mains and other public service utilities.

SAN FRANCISCO, CAL.—The board of works has arranged with Major General A. Murray to install an additional pipe line in the Fort Mason reservation to connect the Fort Mason pumping station of the auxiliary fire-protection system with the high pressure mains. The city is to put in three fire hydrants at Fort Mason, connecting with this pipe, and is to join the water system of the reservation to the high pressure valves.